Axcelis Technologies
The Next Wave of Purion Innovation

August 4, 2020

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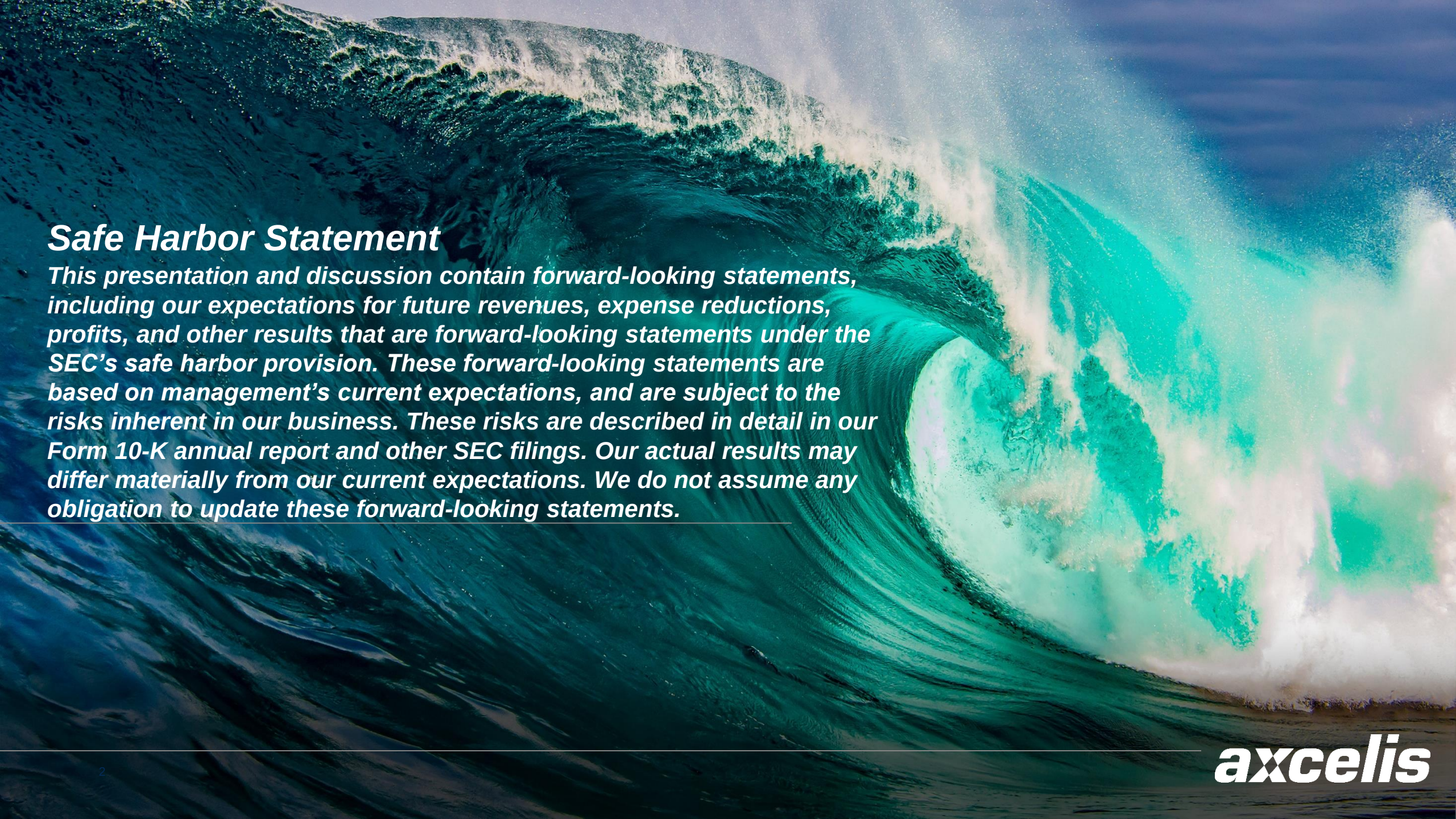

Safe Harbor Statement

This presentation and discussion contain forward-looking statements, including our expectations for future revenues, expense reductions, profits, and other results that are forward-looking statements under the SEC's safe harbor provision. These forward-looking statements are based on management's current expectations, and are subject to the risks inherent in our business. These risks are described in detail in our Form 10-K annual report and other SEC filings. Our actual results may differ materially from our current expectations. We do not assume any obligation to update these forward-looking statements.

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Axcelis is Uniquely Positioned with the Capability, DNA, and Unwavering Focus to solve customers' high value, high impact, ion implantation challenges.
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Q2 Highlights & Summary

- **Strong Q2 financial performance during a difficult period**
  - **Revenue of $123M and EPS of $0.39**
  - **Gross margins 42.2%**
  - **CS&I revenues of $46.2M driven by used tool shipments**
  - **Quarter end cash balance of $197M**

- **Near term focus on protecting the health and safety of our employees while meeting customer needs as we manage through the challenges created by COVID-19**

- **Delivering results against long term focus on strategic business objectives**
  - **Shipped first Purion system to Japan – Purion XE for power device application**
  - **Shipped first Purion XEmax evaluation system to large image sensor customer**
  - **Shipped second Purion Dragon evaluation to large DRAM customer**

- **Current market and industry outlook**
  - **Industry is fundamentally strong and 5G data driven thesis is still intact**
  - **Near term COVID-19 situation causing some end customer delays**
  - **Memory investment expected to strengthen in 2021**

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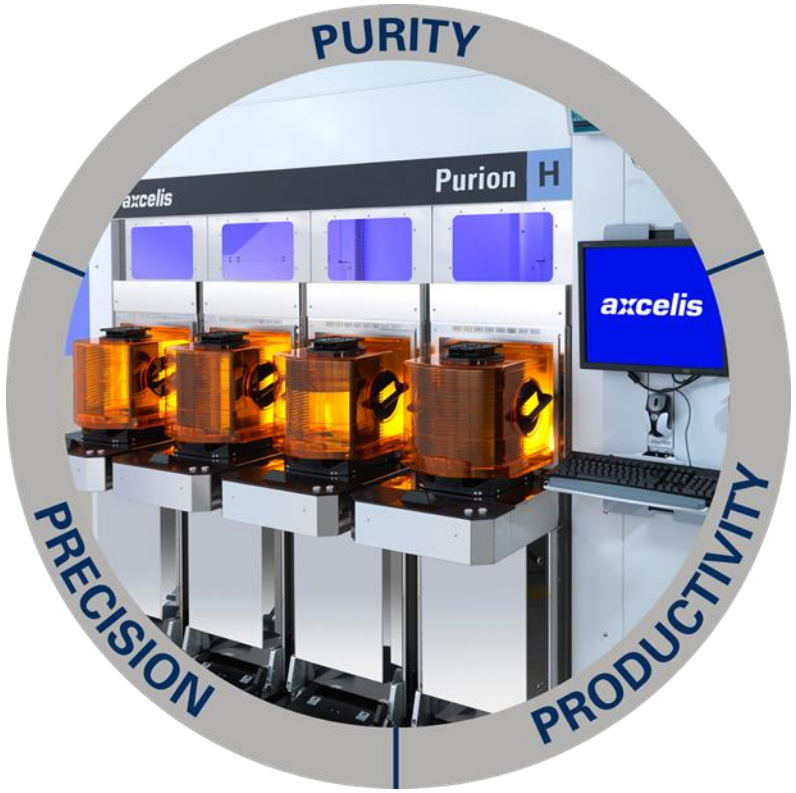
Axcelis at a Glance

- **Global leader in technology development and manufacturing of ion implant systems and services for the semiconductor industry for over 40 years**
  - **Serving an estimated $1B ion implant systems market**
  - **Based in Beverly, MA with headcount of approximately 1000 worldwide**
  - **Global infrastructure supporting customers in 31 countries**
  - **Growing installed base of over 3200 tools**
  - **Strong IP portfolio with >800 patents**

- **Supplier of record to leading semiconductor CAPEX spenders in all market segments including DRAM, Flash, Foundry and Logic**

The Purion Platform
The Core of Our Growth Strategy



- Innovative scanned spot beam architectures with advanced energy filters
- Common endstation and control system
- Advanced source technology

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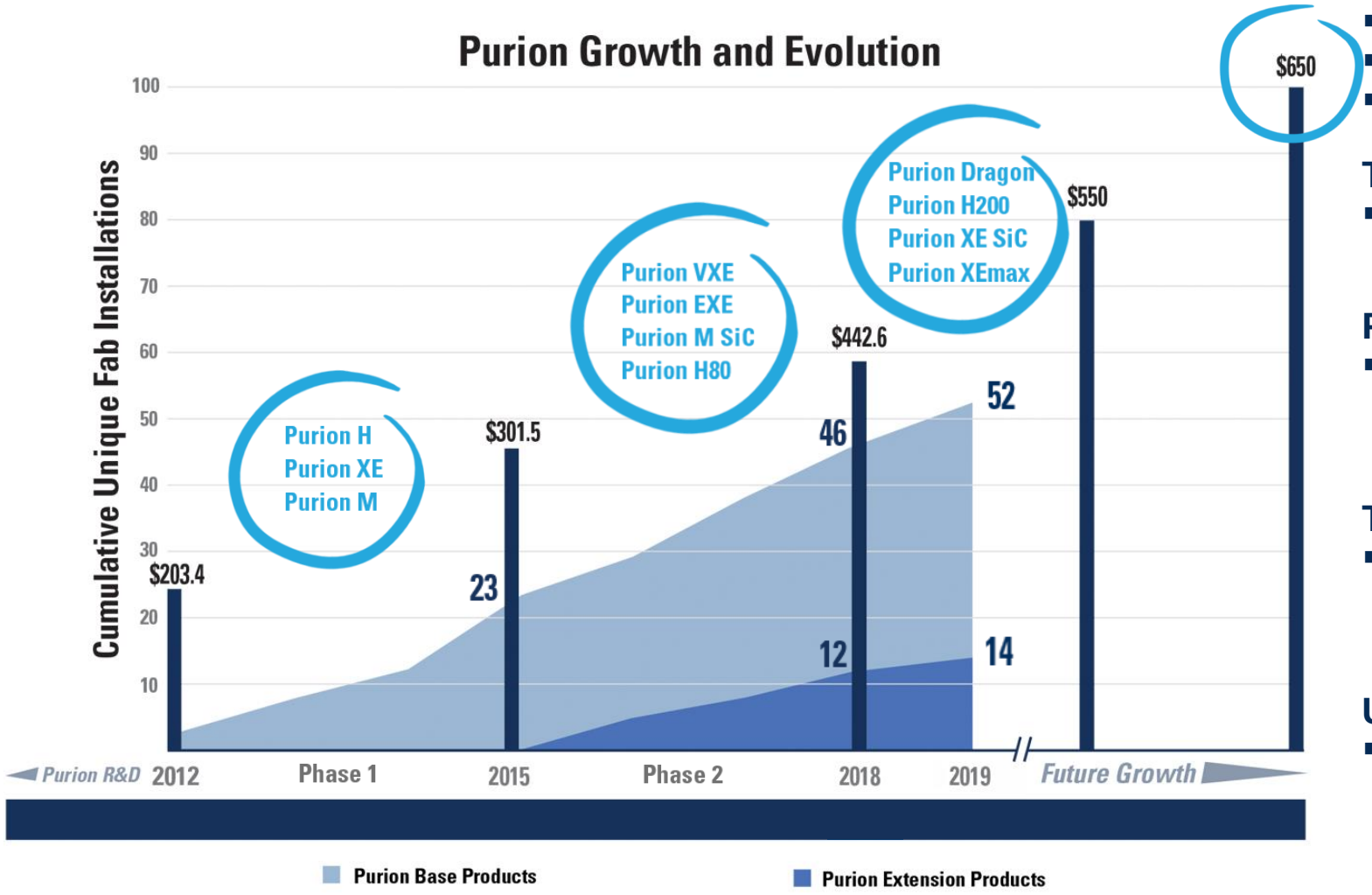
Purion – Fueling Axcelis' Growth



KEY TAKEAWAYS

- New product introductions
- New target business model
- Impact of segment targeted products

THE BEGINNING OF PURION

- Created the organization required to develop the common platform and base products

FOCUSED MARKET SEGMENTATION

- Established differentiated segment-focused Purion products that deliver high value to customers

THE NEXT WAVE OF PURION

- Accelerate the segment-focused strategy into the high current market that represents ~55%-60% of the Ion Implant TAM

UNWAVERING FOCUS

- Solve high value, high impact implant challenges that will drive customer, employee and investor satisfaction

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Purion Growth Initiatives

- **Geographic expansion**
  - **China is the fastest growing region typically accounting for ~30% of Axcelis' revenue**
    - **Large geography with many new customers**
    - **Investing in sales and service personnel and support infrastructure**
  - **Japan represents 15% of the overall $1B ion implant TAM**
    - **First Purion XE sale in Japan to power device customer**
    - **Training and demonstration center at SCREEN SPE Process Technology Center in Hikone, Japan**
    - **Strong market for image sensors, NAND and power devices**
- **Increase footprint at our existing customer base**
  - **Adding Purion product types and served applications through joint development and focused segment and product differentiation**
- **New implant applications**
  - **Collaborating with customers and industry peers to develop novel uses for ion implant**

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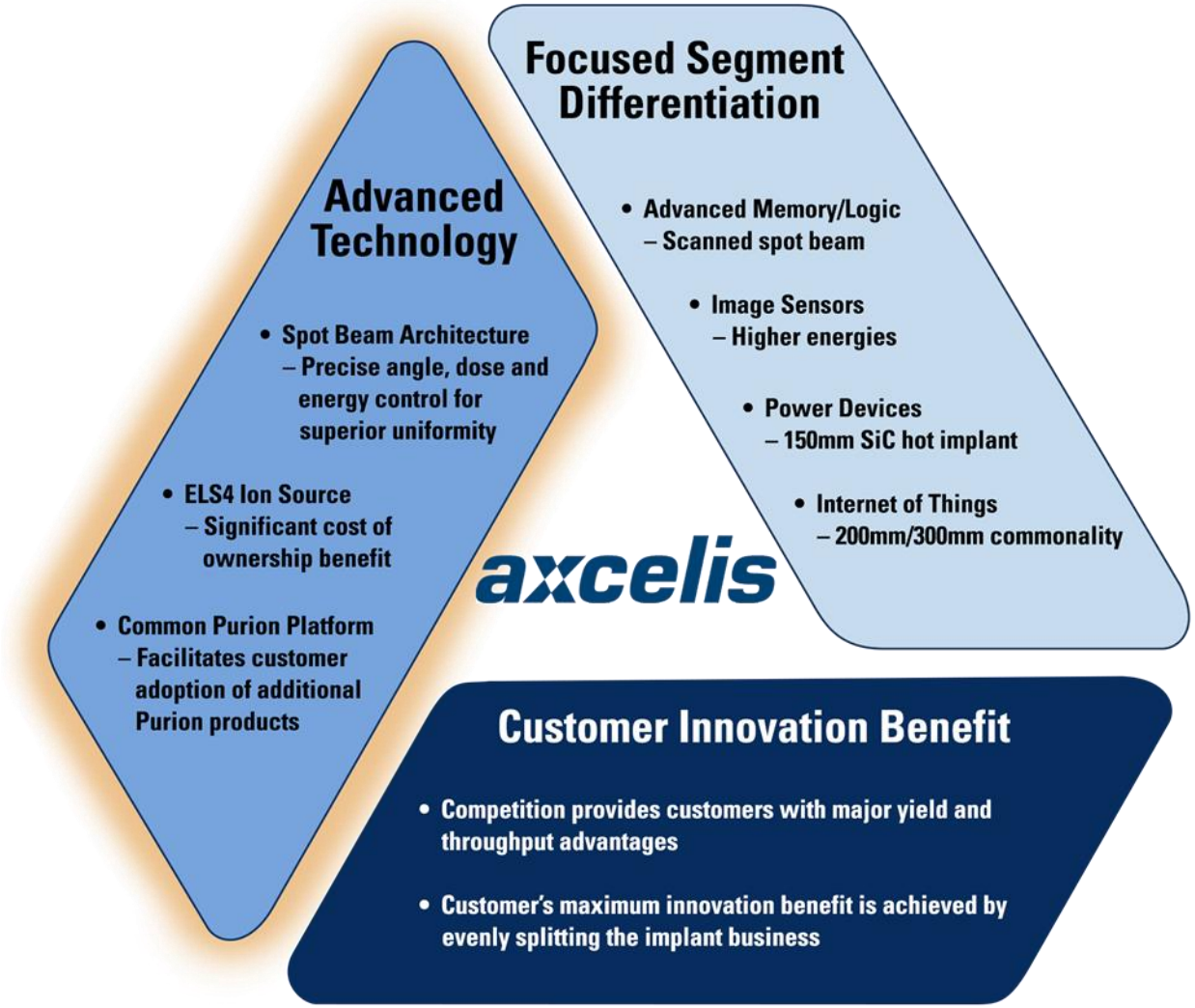
Why Customers Choose Purion – Advanced Technology



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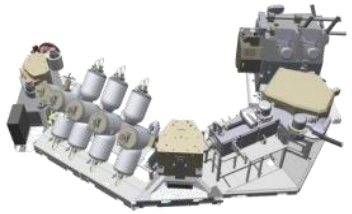
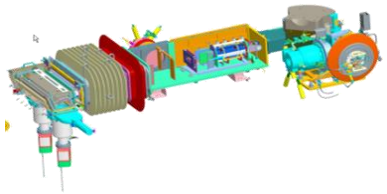
Axcelis Purion Platform
Most Innovative Ion Implant Products Available

Enhanced Scanned Spot Beam Technology

RF Linear Accelerator Technology



Energy Filter Based Beamline Technology

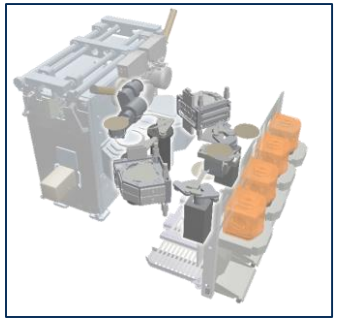


Common Purion Platform
- 500WPH End Station
- Vector Control System™
- Eterna ELS4 Source™

High Current

High Energy

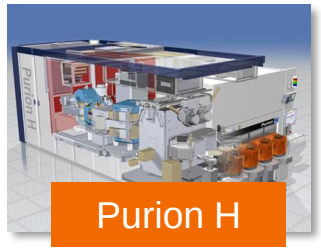
Medium Current

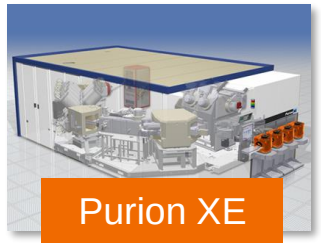


High Current

High Energy

Medium Current





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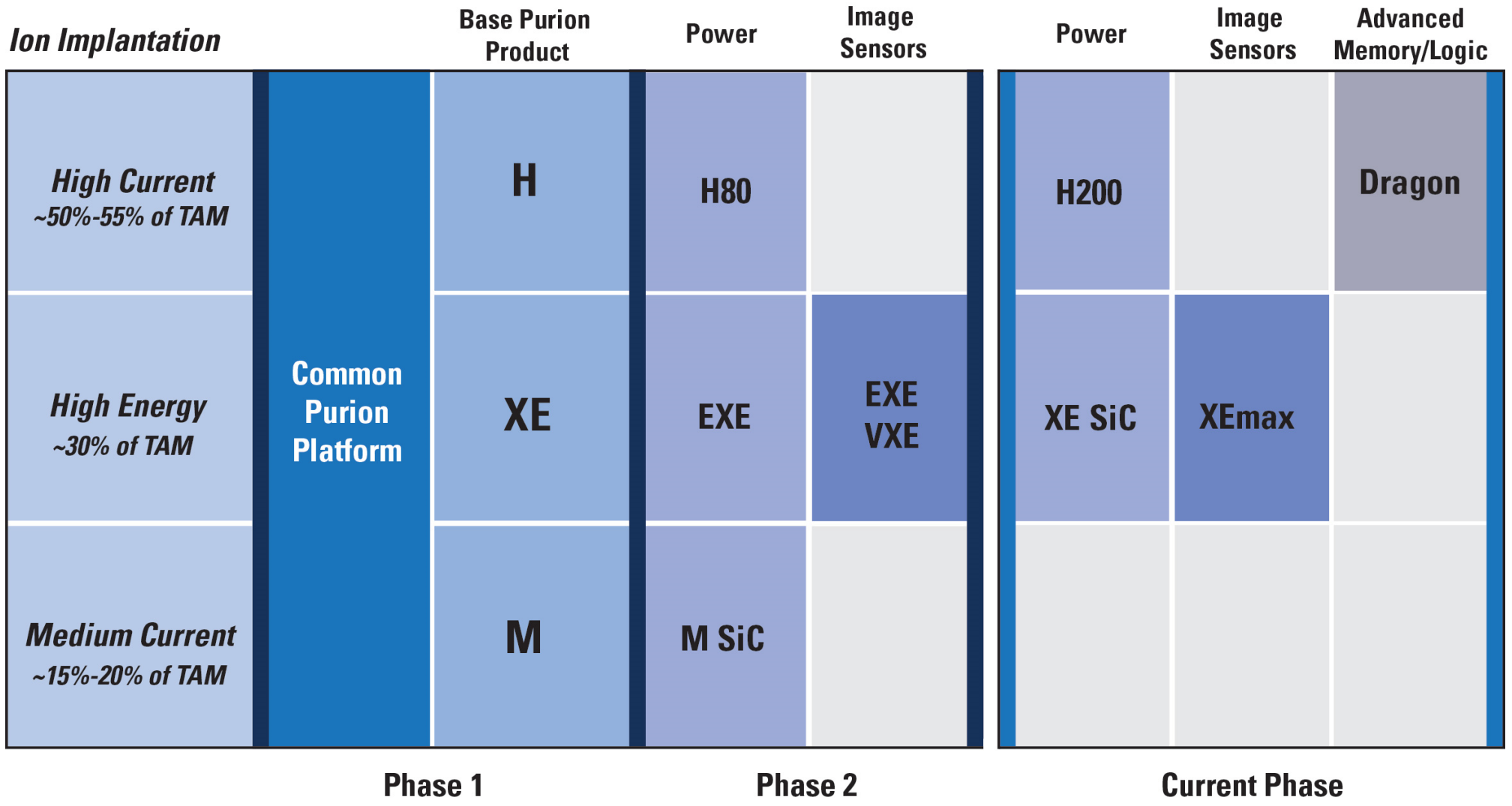
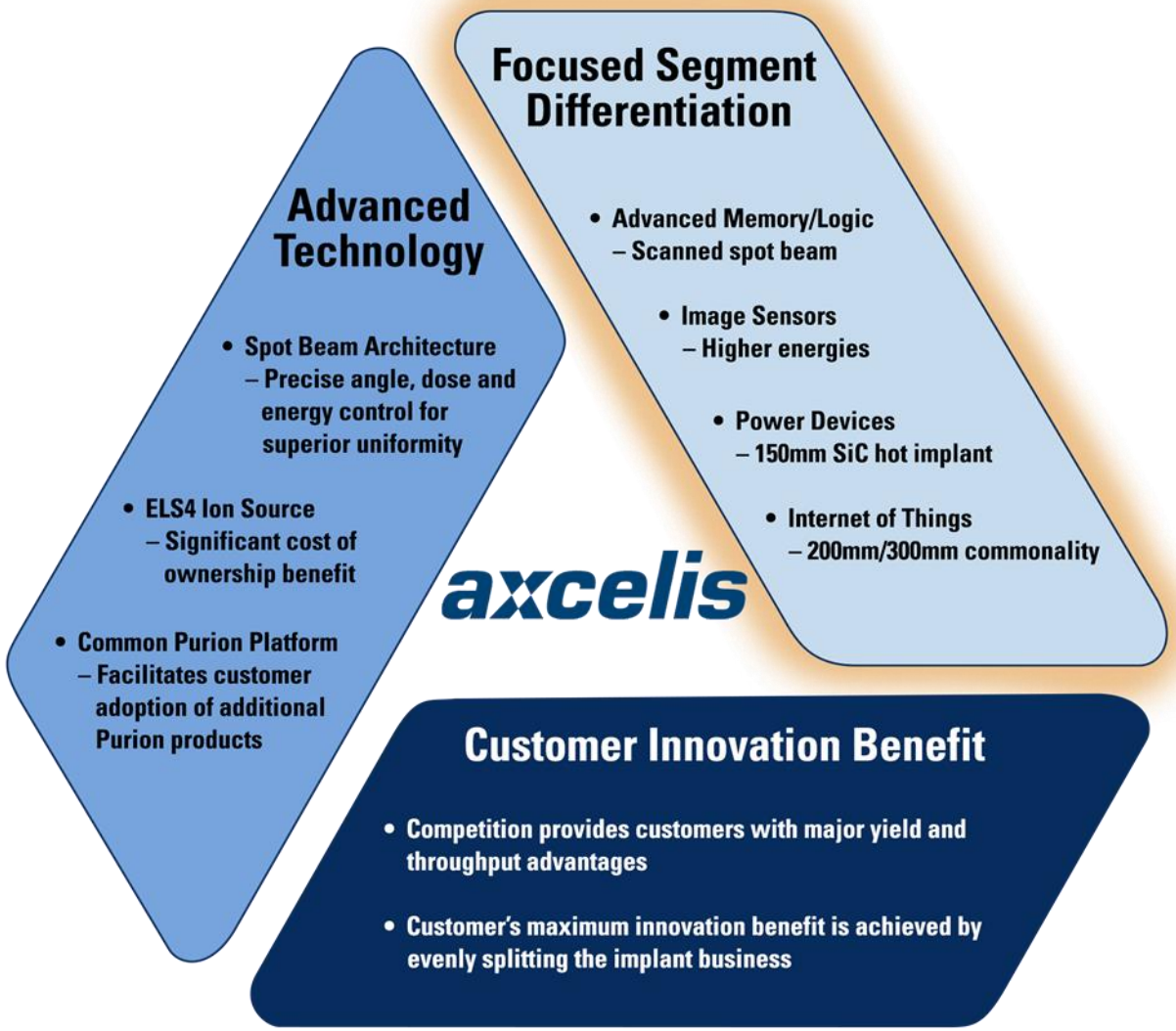
Growing the Purion Product Family in Targeted Market Segments



Why Customers Choose Purion – Focused Segment Differentiation



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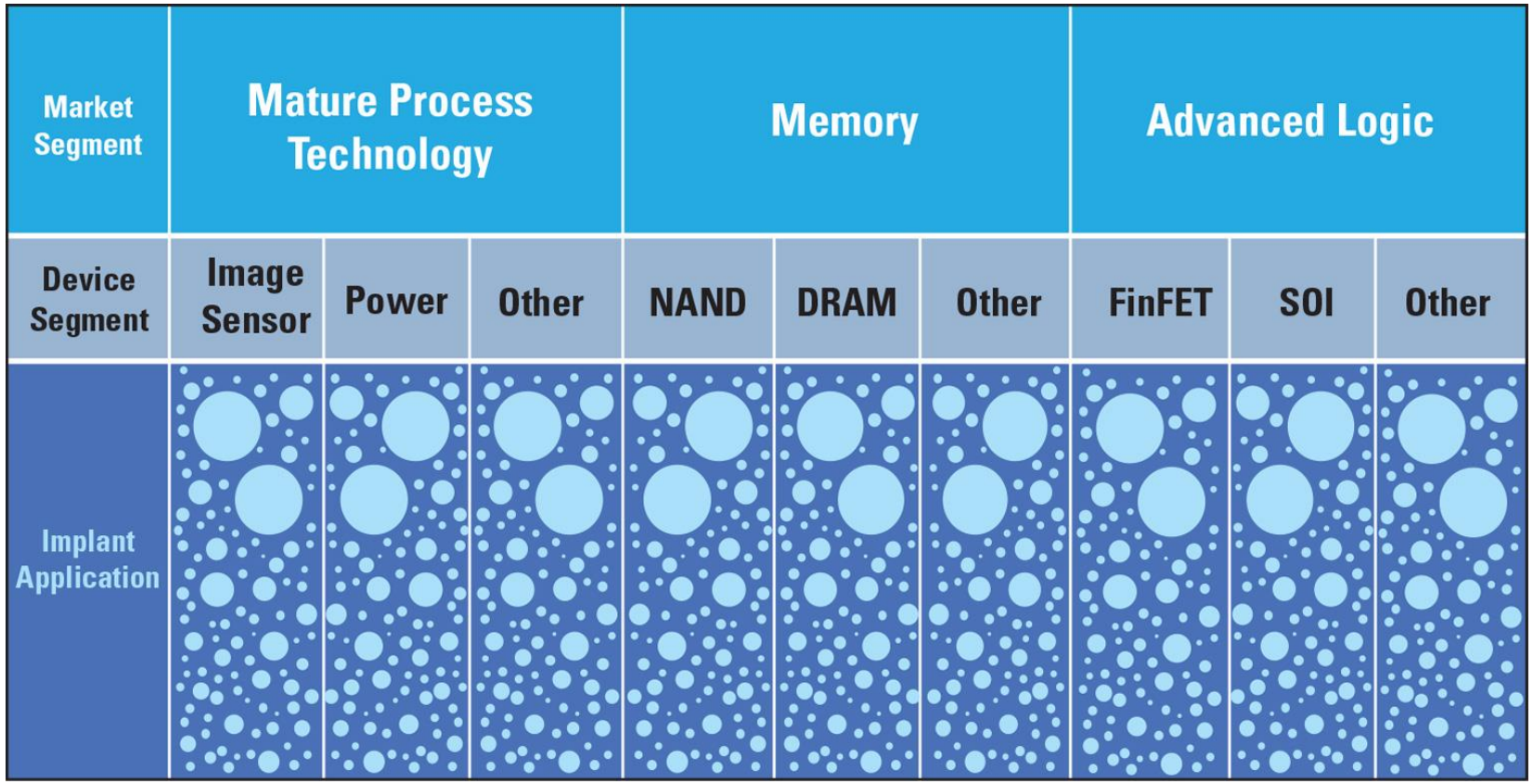
Develop Purion Product Line Extensions Based on High Level Market Segmentation and Analysis of Advanced and Emerging Technologies



Segment by process technology

- Work with customers and industry peers to identify implant opportunities

Segment by device type

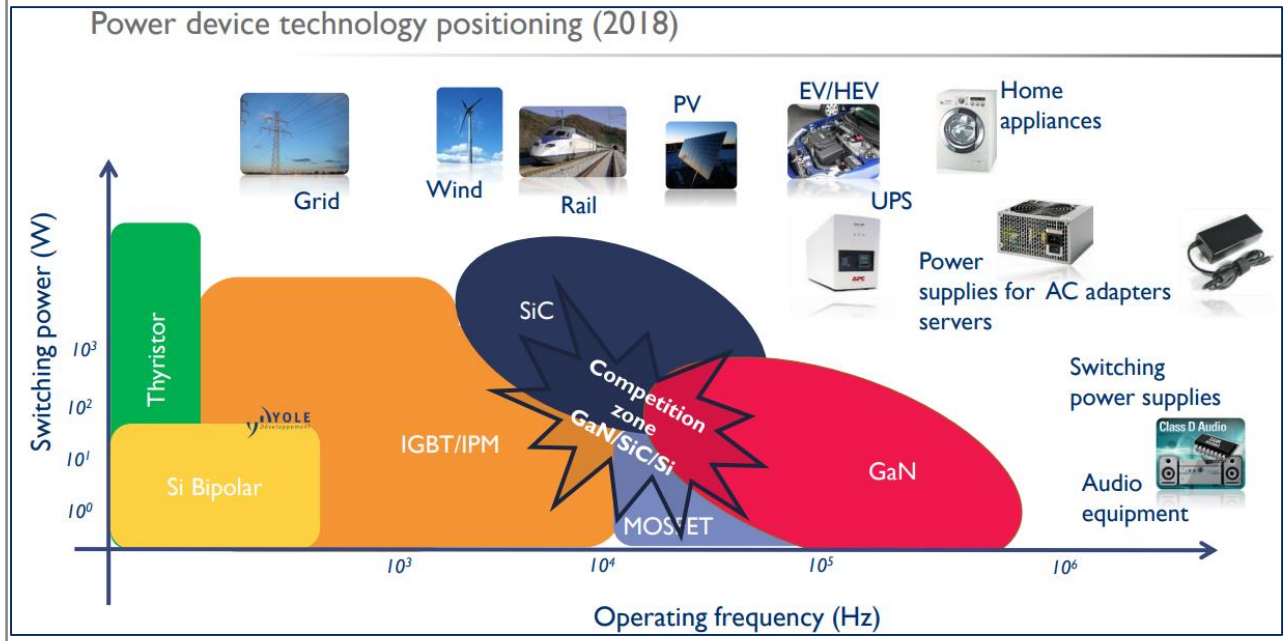
- Work with device engineers to identify implant opportunities

Assess 30-40 implant recipes

- Identify high value/high impact implant recipes for customer.
- Analyze the market opportunity
- Develop Purion product extension using CPD

This illustrative example chart represents an example of some market segments

Power Device Market – Strong Market Growth with Increasing Implant Capital Intensity



Yole Development

- Power device market comprised of multiple device technologies
  - Multiple device structures, including MOSFET, IGBT, and Bipolar devices
  - Multiple material types – Si, SiC, GaN
- Selected Device technology of choice driven by specific application requirements
  - Power requirements, max voltage, operating frequency, size constraints, weight constraints, power loss limitations, etc.
- Strong growth in overall power device market driven by industrial and automotive industries
- Growing need for new implant capabilities

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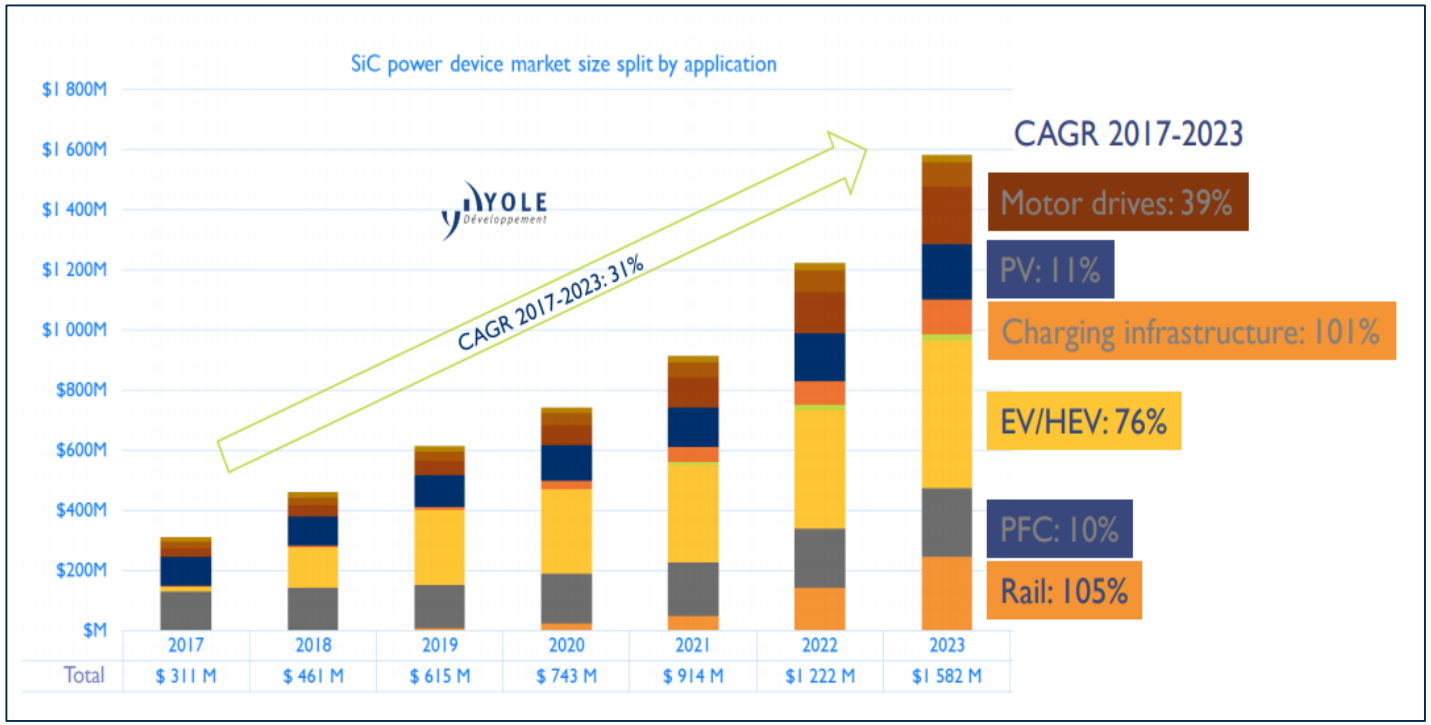
SiC Power Device Market – Very High Growth Rate with High Implant Capital Intensity



- SiC devices have emerged as a leader in markets requiring high power with high operating frequency
  - Strong adoption for EV/HEV market and renewable energy
- Driving the need for an expanding set of new implant capabilities

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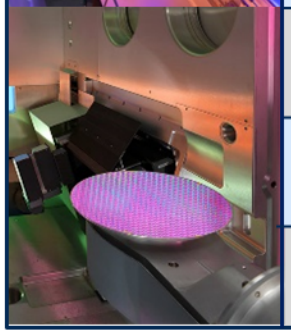
Purion Power Series – Optimized for the Growing Power Device Market

Purion Power Series		SiC			Si			
		M	XE	H	M	XE	H	H_{200}
	Aluminum Implantation	✓	✓		✓	✓		
	150mm Wafer Handling	✓	✓		✓	✓		
	Hot Implantation to 700˚C For 150mm Wafers	✓	✓		✓	✓		
	80keV Antimony Implantation						✓	
	200mm Thin Wafer Handling				✓		✓	
	80keV High Current Capability						✓	
	200keV High Current Capability							✓

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Purion XE SiC –
New High Energy Extension Targeting Advanced Power Device Applications

- Built off industry leading Purion XE product
- RF Linear Accelerator technology delivers industry's highest productivity and reliability
- Leverages proven Purion M SiC technology
  - Hot implant wafer processing
  - Aluminum source technology

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Purion H200 –
New Extension to the Purion H Family Targeting Power Device Applications

- A unique high current architectural solution for emerging high dose, higher energy applications
- High current architecture enables a large productivity/CoO advantage versus competitive medium current based solutions
- Built off of Axcelis' Purion H60 and Purion H80 products

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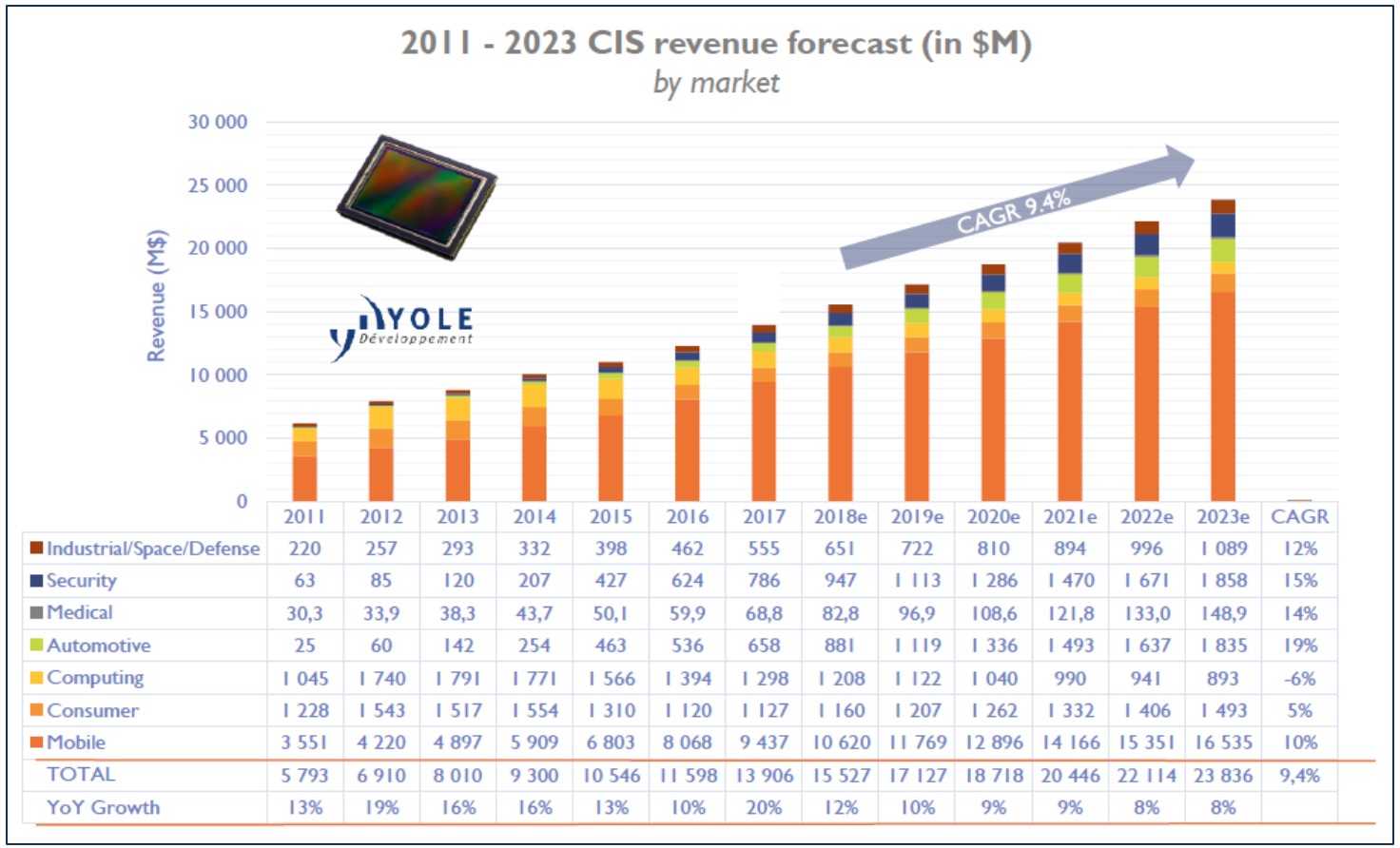
Image Sensors – Strong Market Growth with High Implant Capital Intensity



	2011	2012	2013	2014	2015	2016	2017	2018e	2019e	2020e	2021e	2022e	2023e	CAGR
Industrial/Space/Defense	220	257	293	332	398	462	555	651	722	810	894	996	1 089	12%
Security	63	85	120	207	427	624	786	947	1 113	1 286	1 470	1 671	1 858	15%
Medical	30,3	33,9	38,3	43,7	50,1	59,9	68,8	82,8	96,9	108,6	121,8	133,0	148,9	14%
Automotive	25	60	142	254	463	536	658	881	1 119	1 336	1 493	1 637	1 835	19%
Computing	1 045	1 740	1 791	1 771	1 566	1 394	1 298	1 208	1 122	1 040	990	941	893	-6%
Consumer	1 228	1 543	1 517	1 554	1 310	1 120	1 127	1 160	1 207	1 262	1 332	1 406	1 493	5%
Mobile	3 551	4 220	4 897	5 909	6 803	8 068	9 437	10 620	11 769	12 896	14 166	15 351	16 535	10%
TOTAL	5 793	6 910	8 010	9 300	10 546	11 598	13 906	15 527	17 127	18 718	20 446	22 114	23 836	9,4%
YoY Growth	13%	19%	16%	16%	13%	10%	20%	12%	10%	9%	9%	8%	8%	

- **Image sensor market continues to thrive with CAGR of >9% through 2023**
  - **High growth in most segments including automotive, security and industrial**
  - **Volume to continue to be driven by mobile as more sensors added to smart phone devices**
  - **“Cameras per smart phone” forecast to grow at 6.2% CAGR**

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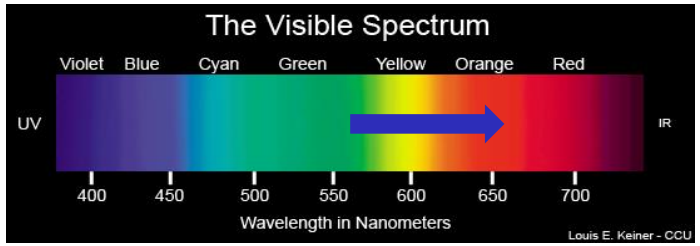
Image Sensors – Emerging Device Fabrication Technical Requirements



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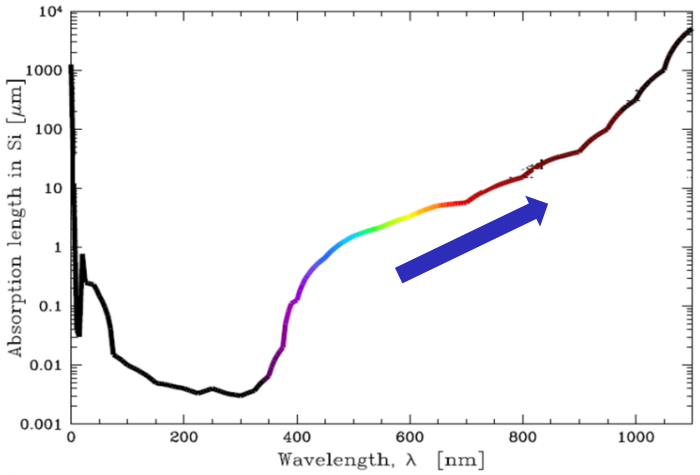

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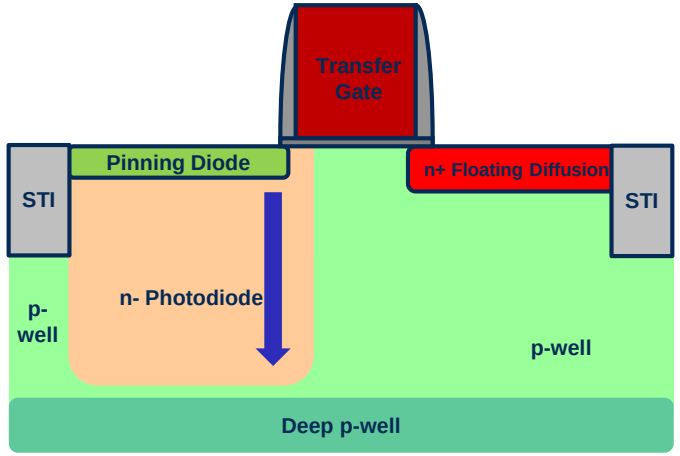

- Drive towards ever improving image sensor (CIS) performance in the deep red to infra-red regions
- Longer wavelengths associated with the red to infra-red region of light spectrum have larger absorption lengths in Si
- In turn, driving requirement for deeper image sensor photodiodes and related isolation well depths
- Ultimately moving max energy requirements to higher MeV levels: >12MeV

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Purion Image Sensor Series
Optimized for the Image Sensor Device Market

Purion Image Sensor Series	Si			
	XE	EXE	VXE	XE*max*
Max Energy 4.5 MeV	✓			
Max Energy 5.25 MeV		✓		
Max Energy 8 MeV			✓	
Max Energy >12 MeV				✓
LINAC Technology	✓	✓	✓	✓
Boost Technology				✓
Advanced Metals Control (Boost Technology)				✓
200mm/300mm Wafer Handling	✓	✓	✓	✓
Field Upgradeable		✓		

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Purion XEmax –
New High Energy Extension Targeting Advanced Image Sensor Applications

- **Patented Boost Technology™**
- **Filters out energetic metals for reduced dark current and white pixel count levels**
- **Enables energy capability for emerging high performance image sensors**
- **Strong CoO performance**
  - **New technology enables a dramatic productivity advantage for customers**

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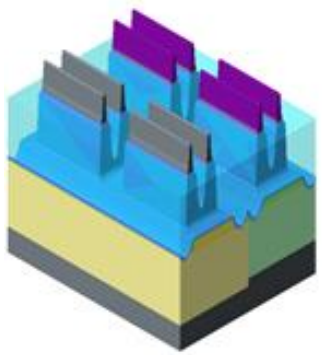
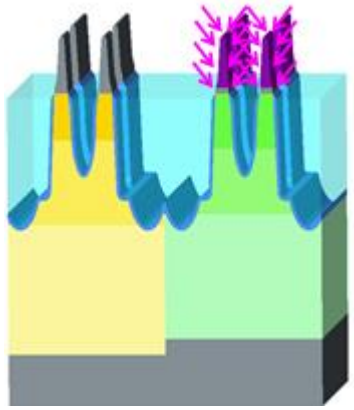
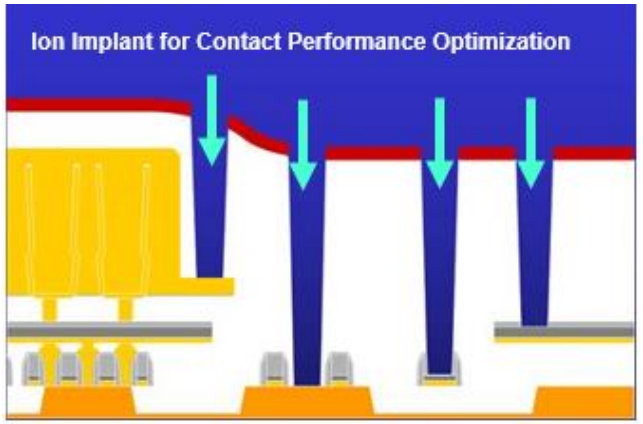
Advanced Memory and Logic/Foundry Devices
Emerging Implant Requirements







- Overall scaling objectives being accomplished through strategies beyond traditional scaling
  - Ever increasing use of 3D architectures
  - Expanding use of new or modified materials
- Implications for ion implant include
  - Increasing use of shallow implants for electrical contact performance optimization
  - Related high aspect ratio and 3D structures require improved angle and dose control
  - Increasing use of material modification implants, often at very low energies
- Cost of Ownership (CoO) remains a dominant focus area for customers, driving continued need to improve implanter productivity

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Purion Dragon – Revolutionary New High Current Implanter Architecture

- Purion Dragon orthogonal beam optics advances high current productivity to the next level
- Focuses on low energy, high dose applications for advance memory & logic devices
- System's advanced spot beam technology delivers best in class dose and angle control for most challenging high aspect ratio and 3D structure applications
- Product is a result of a Joint Development Program with a leading memory customer

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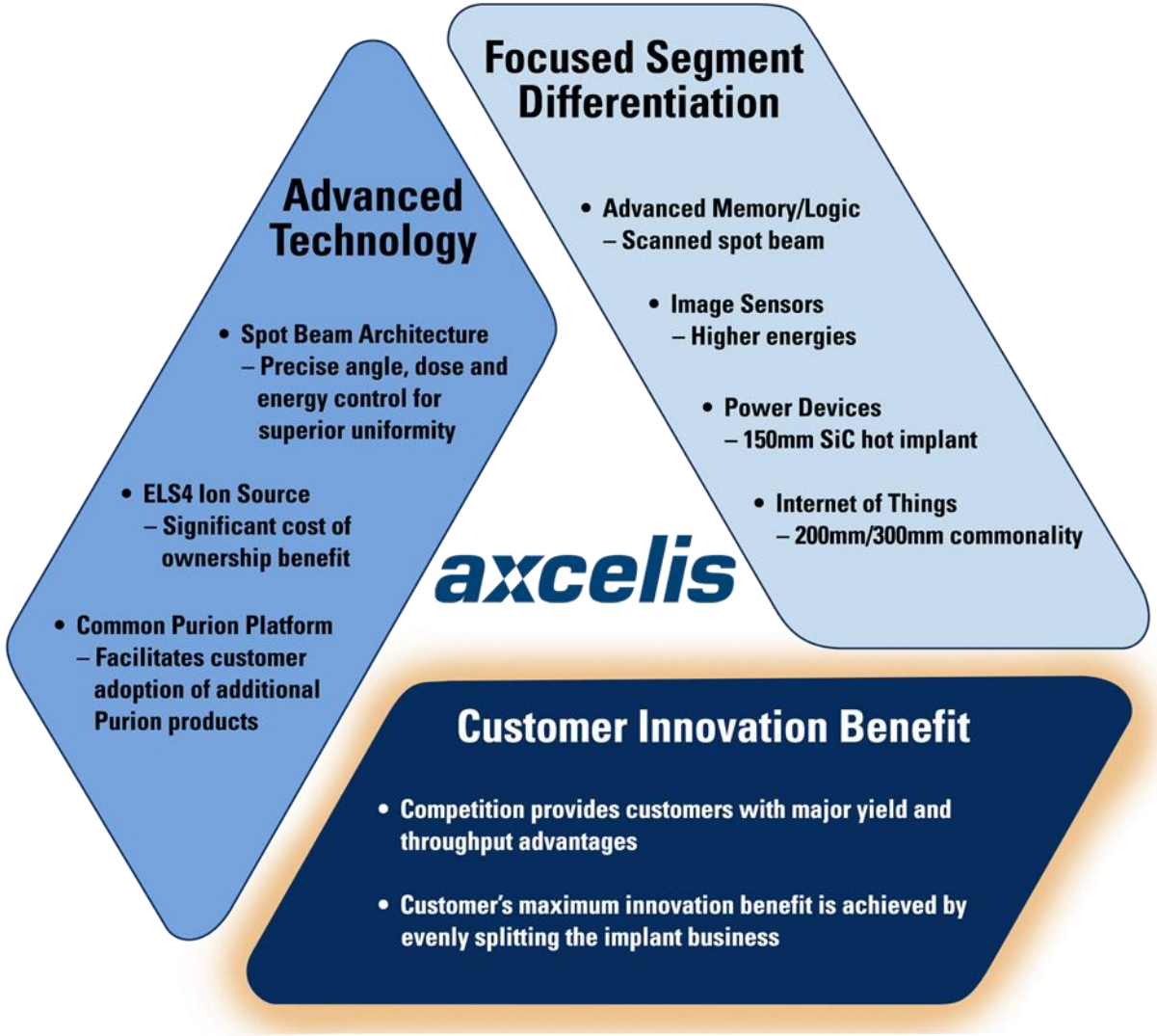
Why Customers Choose Purion – The Innovation Benefit



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Financials

Financial Results and Outlook (GAAP)

	Q2 2020	Q3 2020 Outlook
Revenue	$123M	~$110M
Gross Margin	42.2%	~42.5%
Combined R&D and SG&A Expenses	$35.5M	~$36M
Operating Profit	$16.4M	$10.5M - $11.5M
Net Income	$13.3M	
EPS	$0.39	~$0.24
Total Cash	$197M	
Debt	$0	
Inventory	$149.2M	

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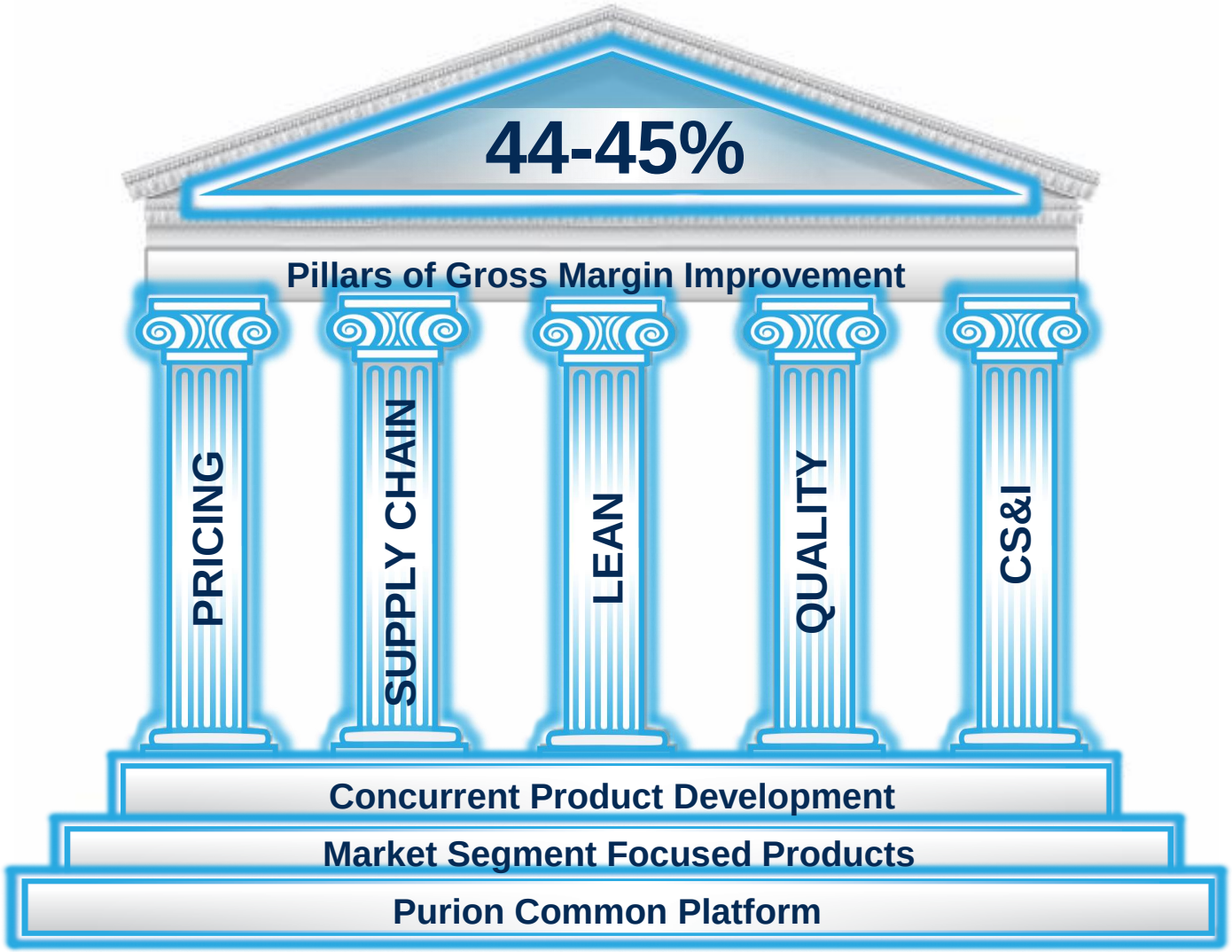
Gross Margin Provides the Fuel for Investment and Profitability



PRICING
- Product extensions
- New products
- High value upgrades

SUPPLY CHAIN
- Make vs Buy decision
- Leverage volume and Purion commonality
- Global sourcing

LEAN
- Cycle improvement
- Labor productivity
- Capacity and resource planning

QUALITY
- Improve customer experience
- Enhance organizational capability and efficiency
- Certified ISO9001, In-process IATF 16949

CS&I
- Accretive to the business
- One stop shopping with unique offerings
- Provides strong customer support

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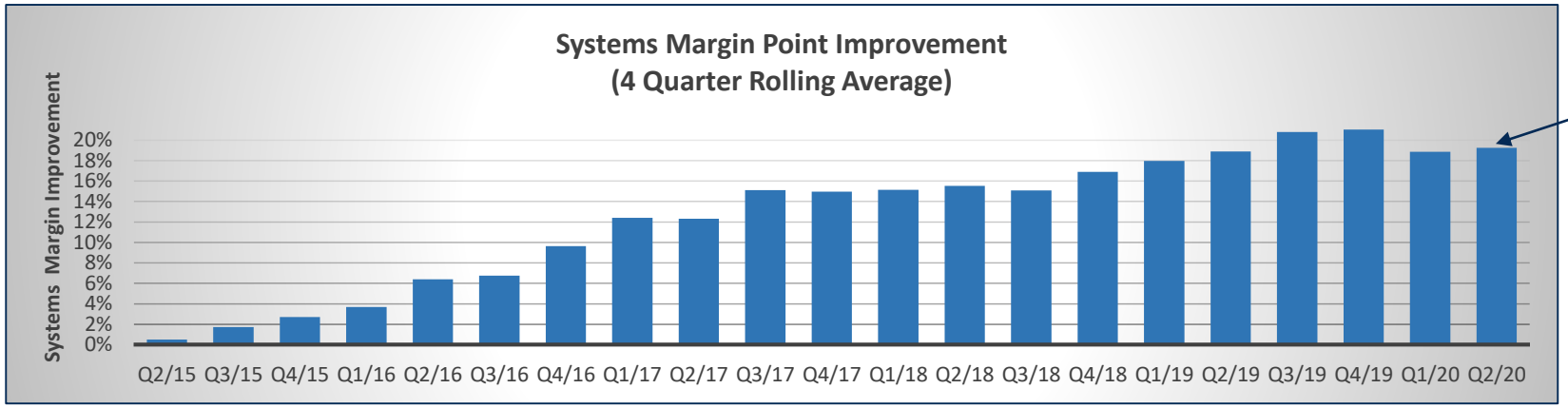
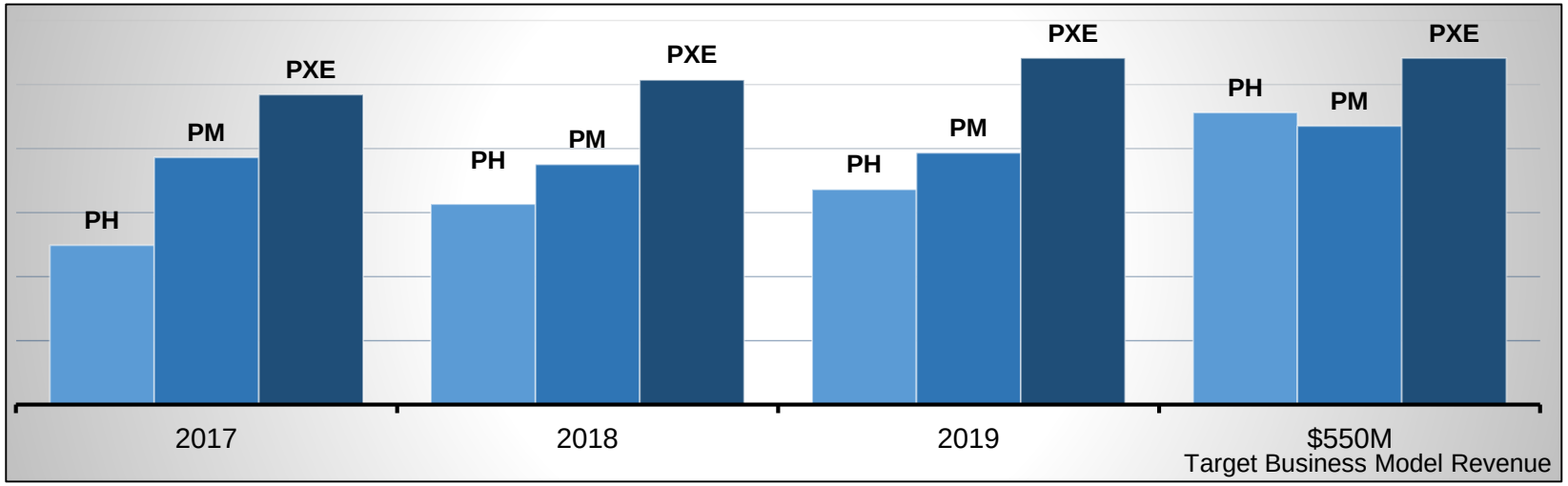
Gross Margins Driven by Product Maturity, Volume and Cost Out Initiatives

Cost Out Initiatives Fueling Steady Margin Improvement



4 Quarter Average Impacted by 3 Evaluation Closures in Q1/20

System Standard Margin Targets



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Target Business Model (GAAP)
The Path to Market Share Leadership

Revenue	$301.5M 2015(A)	$267.0M 2016(A)	$410.6M 2017(A)	$442.6M 2018(A)	$343.0M 2019(A)	$550M Model*	$650M Model*
Gross Margin	33.7%	37.3%	36.6%	40.6%	42.0%	42-43%	44-45%
Total OPEX	26.8%	31.1%	24.9%	27.0%	35.0%	~25%	~24%
Operating Profit	6.9%	6.2%	11.7%	13.5%	7.1%	17-18%	20-21%
Free Cash Flow (Cash From Operations – Capex)	5.5%	(4.1%)	11.9%	9.5%	(7.5%)	>15%	>17%**

* The model is not a forecast of results but is intended to be indicative of the annual results Axcelis may achieve based on our strategic objectives

** Assumes our federal net operating loss carryforwards have been consumed and Axcelis is now paying cash taxes

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Axcelis Capital Strategy

- Our stock repurchase program remains on hold in light of the economic uncertainty relating to the COVID-19 pandemic. As of June 30, 2020, we had approximately $24.8 million remaining under the Board authorized program
- In late May we filed a “well-known seasoned issuer” Form S-3 shelf registration statement covering a future offering of common stock or other securities. As a WKSI, we can file a Form S-3 with the type and amount of securities to be specified in the future
- We established a new $40 million dollar line of credit
- These financing vehicles offer flexibility for our cash strategy
- The company will maintain a conservative view on cash in this current economic environment and maintain a strong, healthy balance sheet

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